SAP2000® Version 20.0.0
Release Notes

Notice Date: 2017-12-14

This file lists all changes made to SAP2000 since the previous version. **Most changes do not affect most users.** Incidents marked with an asterisk (*****) in the first column of the tables below are more significant.

Changes from v19.2.2 (Released 2017-12-12)

User Interface and Display
Enhancements Implemented

*	Incident	Description
	202086	An enhancement has been implemented to keep the object assignment toolbars enabled when the model is unlocked, consistent with the corresponding menu items.
	203261	An enhancement was implemented where the drop-down lists for point objects in the object connectivity form accessed from the right click form were modified to allow typing in the point name and were also modified to have the point names sorted alphabetically.

Modeling
Enhancements Implemented

*	Incident	Description
*	203387	An option has been added to control the limiting negative stiffness ratio for Frame Hinges. This option is available as a Hinge Overwrite for frame elements, under Assign > Frame > Hinge Overwrites in the menu. The limiting negative stiffness ratio defaults to 0.1, which is identical to previous versions of the program. This means that the descending slope is only 10% as stiff as the initial elastic stiffness. This ratio may now be increased up to 1.0. Using larger descending stiffness values increases the risk of elastic snap-back, which can cause convergence difficulties. Additionally, the Hinge Overwrites assignment form was enhanced to allow assignment of the Auto Subdivide and Hinge Behavior Parameters independently.

Loading
Enhancements Implemented

*	Incident	Description
*	207950	An enhancement was implemented to add automated seismic loading according to the IS 1893:2016 code.
*	207951	An enhancement was implemented to add automated seismic loading according to the ASCE 7-16 code.
*	207952	An enhancement was implemented to add automated seismic loading according to the Korean Building Code (KBC) 2016.
*	207953	An enhancement was implemented to add automated response spectrum functions for the IS 1893:2016 code.
*	207954	An enhancement was implemented to add automated response spectrum functions for the ASCE 7-16 code.
*	207955	An enhancement was implemented to add automated response spectrum functions for the Korean Building Code (KBC) 2016.

*	Incident	Description
*	207956	An enhancement was implemented to add automated wind loading according to the ASCE 7-16 code.
*	207957	An enhancement was implemented to add automated wind loading according to the Korean Building Code (KBC) 2016.

Analysis

Enhancements Implemented

*	Incident	Description
*	43945 96397	An enhancement was implemented to account for effect of reinforcing steel on the axial creep and shrinkage behavior of concrete in columns and walls. The users can specify the rebar in individual columns and walls, or they can be taken from the most recent concrete frame or wall design. This enhancement only affects time-dependent staged-construction load cases. This formulation utilizes the steel reinforcement correction factor as described in "Creep and Shrinkage and the Design of Supertall Buildings - A Case Study: The Burj Dubai Tower" by W.F. Baker, D.S. Korista, L.C. Noval, J. Pawlikowski, and B. Young (2007), ACI Special Publications, 246.
*	203151	An enhancement was implemented to add a pure event-to-event option for nonlinear static analysis, which can be particularly useful for static pushover analysis. This is similar to the pure event-to-event method available for nonlinear direct-integration time history analysis, and is in addition to the iterative event-to-event stepping strategy already available for nonlinear static load cases. Load steps will be automatically subdivided where changes occur in the stiffness of nonlinear elements. In contrast to the iterative method, more events will typically be generated, but iteration for equilibrium will not be performed under the assumption that the deviation from linearity will be small between events. Instead, any equilibrium errors are carried forward to the next load step and applied as a corrective load. This is similar to the method used in Perform-3D. This method may not be appropriate in cases with a large degree of geometric nonlinearity. Pure event-to-event stepping can be more efficient than iterative methods for small to medium sized models, but may not be so for large models with many nonlinear elements. Pure event-to-event stepping can also be helpful for models where convergence cannot be achieved with iterative methods, although the results should be reviewed for equilibrium. Additional minor changes have been made to the iterative methods used in nonlinear static and direct-integration time history load cases to improve convergence behavior. Results may change slightly compared to previous versions, but should be within the convergence tolerance for stable models.

Frame Design

Enhancements Implemented

*	Incident	Description
*	200697	An enhancement was implemented to add steel frame design according to the AISC 360-16 code and the AISC 341-16 seismic provisions.

Data Files

Enhancements Implemented

*	Incident	Description
	103360	An enhancement was implemented to leave the case (upper or lower) of frame section property names as defined in the *.pro section property libraries when importing sections. Previously the name was changed to all capitals when imported.

Application Programming Interface
Enhancements Implemented

*	Incident	Description
	201345	An enhancement was implemented, adding a new function to the API for each of the object types, which provides a way to retrieve the list of groups to which a specified object is assigned. The following API functions were added: PointObj.GetGroupAssign(), FrameObj.GetGroupAssign(), AreaObj.GetGroupAssign(), SolidObj.GetGroupAssign(), LinkObj.GetGroupAssign(), TendonObj.GetGroupAssign(), CableObj.GetGroupAssign().

Miscellaneous
Enhancements Implemented

*	Incident	Description
	202890	The version number has been changed to v20.0.0 for a new major release.

User Interface and Display
Incidents Resolved

*	Incident	Description
	89156	An incident was resolved in which the Assign Frame Temperature Loads toolbar button incorrectly opened the Assign Frame Material Temperature form. This was a user interface issue only.
	202150	An incident was resolved where applied frame loads were not displayed on screen for the element model. This was a display issue only. Loads were correctly displayed for the object model.
	202775	An incident was resolved to correct the position of the Time Range Plotted label on the Material Property Time Dependence Plot form when only creep was selected to be considered. This was a user interface issue only and did not affect results.
	203711	An incident was resolved in which a warning message was shown when displaying concrete shell design results for a model that contained any layered shell objects. Concrete shell design is not currently supported for layered shell objects and has now been disabled to eliminate the warning message.
	204416	An incident was resolved in which a duplicate ordinate warning message was displayed when trying to add a gridline. This typically occurred when the current display units were different than the database units and the newly added gridline was close to an existing gridline. This was a user interface issue only and did not affect results.
	204567	An incident was resolved on the replicate form for mirroring about a 3-D plane, where using the pick points capability did not populate coordinates for the third picked point.
	204607	An incident was resolved for the interaction curve definition form for frame hinges in which the mouse over values shown on the Plot of Full Interaction Curve image were not presented correctly. This was only an issue on the form and did not affect analysis results.
	206791	An incident was resolved where the Selection by Specifying a Coordinate Range feature did not work correctly when the current units were different from the model database units.

Graphics
Incidents Resolved

*	Incident	Description
	80641	An incident was resolved in which the extruded view of T-sections was incorrect when the mirror about 3-3 insertion point option was applied. This was a graphical issue only and did not affect results.

*	Incident	Description
	202737	An incident was resolved where in DirectX graphics mode, if the fill was on for area objects some objects could appear unfilled if another object was added adjacent to it. This was a display problem only. GDI+ graphics mode worked as expected.
	203291	An incident was resolved where selected objects could not be excluded from the model display in certain cases: (1) When displaying the deformed shape or other response quantities (stresses, forces, or moments) for a nonlinear static load case that continued from a previous nonlinear load case, all objects were being set to visible and none could be removed from the view; (2) When displaying the undeformed geometry using the Load Case Tree form, all objects were being reset to visible even though some of the objects might have been removed from the view before using the command Display > Show Load Case Tree. This was a display issue only and did not affect any analysis or design results. This issue affected the use of the View menu commands: Show Section Only, Invert View Selection, Remove Selection from View, and Restore Previous Selection to View. These commands are also available by right-clicking in the model window.

Drafting

Incidents Resolved

*	Incident	Description
	82992	An incident was resolved where in some instances when starting to draw new objects the snaps would not immediately be activated and a click was required to provide focus to the drawing form.
	203861	An incident was resolved where drawing additional reference lines after a save operation or after 20 lines had already been drawn would delete the earlier drawn reference lines.
	204444	An incident was resolved where the measure area tool would report an incorrect value if the current display units were different than the database units.
	204561	An incident was resolved where using the previous selection command after replicating any points would select the replicated points in addition to the original points.

Modeling

Incidents Resolved

*	Incident	Description
*	203153	An incident was resolved where the deformation-type hysteresis parameters for types Degrading and BRB Hardening were specified as a ratio of yield for rigid-plastic frame hinges, which have no yield deformation. The affected parameters are "Moderate Deformation Level" and "Maximum Deformation Level" for Degrading hysteresis; "Maximum Plastic Deformation at Full Hardening" and "Accumulated Plastic Deformation at Full Hardening" for BRB Hardening hysteresis. These parameters have been revised to specify these deformations (displacements or rotations) normalized by the hinge deformation scale factors instead of yield deformation. This only affects models with frame hinges that use Degrading or BRB Hardening hysteresis and non-default hysteresis parameters. For affected models, please review the specified hysteresis parameters in the new version of the software.
	203377	An incident was resolved where the analysis model was unable to be created when the model contained triangular area objects with area edge releases assigned.
	203420	An incident was resolved where deletion of a Load Pattern that was used in a Mass Source definition could cause the scale factors for other load patterns in the mass source, occurring in the list after the deleted one, to change.
*	203739	An incident was resolved to correct the following issues for the NZS 3101 time dependent properties: (1) The user-defined basic drying shrinkage strain is used directly for shrinkage computation and Eqn 8.14 in the documentation is removed. (2) The fc > 100 MPa condition for coefficient k5 is removed and Eqn. 8.6 in the documentation is corrected.

Section Designer
Incidents Resolved

*	Incident	Description
	202223	An incident was resolved in the section designer DXF import where geometry was not imported if an aluminum or cold-formed steel material was selected for the SD Material on the import form.

Analysis
Incidents Resolved

*	Incident	Description
*	47671	An incident was resolved where the results of a moving-load load case may not have been correct for a vehicle having variable axle spacing and with the option "Vehicle Remains Fully in Path" selected. The results would be correct for an axle spacing within the specified range, but it may not have been the most critical spacing. This error did not affect fixed axle spacing, and it did not affect the most common, default case where the option "Vehicle Remains Fully in Path" was not selected.
	203934	An incident was resolved in which the results for a steady state case were deleted when modifying a modal case while the model was locked, even if the modal case was not utilized by the steady state case.

Frame Design
Incidents Resolved

*	Incident	Description
	203960	An incident was resolved for steel frame design according to Norsok N-004 2013, where the default design preference values for gammaM0, gammaM1, and gammaM2 were not correct.

Results Display and Output
Incidents Resolved

*	Incident	Description
	75077	An incident was resolved where the axes plotted for the time-history graph that can be shown when creating animations (command File > Create Video) were not properly aligned with the graph itself, and the moving red dot did not properly track the time-history trace. These were display issues only and no results were affected.
	85714	An incident was resolved in which changing the assigned interaction ratio color values would update the legend color in the display but not the color of the objects in the display. This was a graphical issue only and did not affect results.

Data Files
Incidents Resolved

*	Incident	Description
	98591	An incident was resolved where double-clicking a model file to open it could result in the filename being shortened to eight characters.

Application Programming Interface
Incidents Resolved

*	Incident	Description
	203128	An incident was resolved where the API function cPropLink.SetMultiLinearPoints would impose an input parameter restriction on force that was not consistent with the user interface.

External Import/Export
Incidents Resolved

*	Incident	Description
	89028 95987	An incident was resolved for SAP2000 models with beams connected to walls that were exported to Perform-3D in which the generated Perform-3D model had embedded beams to transfer the bending moment from the beam to the wall, but a shear area of 0.001 was assigned causing unexpected Perform-3D results.
	102890	An incident was resolved where rigid diaphragm specifications were not exported to Perform-3D from SAP2000 if they contained joints with restraints for out of plane rotations. These are now allowed.
	102987	An incident was resolved where in some cases the model exported from SAP2000 to Perform-3D would generate an error in Perform-3D because there were no rebar materials defined in the original SAP2000 model. Now a rebar material is added, if none are present, when exporting models from SAP2000 to Perform-3D.
	202151	An incident was resolved where a model could not be exported to a Perform-3D structure file if the model had null areas (area elements with section property "None"). This issue occurs only in models that also have area elements with a section property not set to None.
	202153	An incident was resolved where the export from SAP2000 to Perform-3D would fail if trapezoidal frame sections were present in the model. Additionally, an issue was resolved where some frame sections (e.g. Steel Double Channel and Concrete Precast I-sections) were not correctly exported and the SAP2000 frame objects with these frame sections assigned would not be exported to the Perform-3D model.

Documentation
Incidents Resolved

*	Incident	Description
	101637	The help topic Draw Solid has been removed as the command Draw > Draw Solid does not exist.
	200506	An incident was resolved where the SAP2000 API CHM help Python example would report an AttributeError if a certain version of the Python package "comtypes" was installed. The API example has been updated to include the correct package version.